

Superior Performance Guided Wave Radar Level and Interface Transmitter



About this guide

This installation guide provides basic guidelines for Rosemount 5300 Series transmitters. It does not provide instructions for configuration, diagnostics, maintenance, service, troubleshooting, Explosion-proof, Flameproof, or intrinsically safe (I.S.) installations. Refer to the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530) for more instruction. The manual and this Quick Installation Guide (QIG) are also available electronically on www.rosemount.com.

WARNING

Failure to follow safe installation and service guidelines could result in death or serious injury

- Make sure the transmitter is installed by qualified personnel and in accordance with applicable code of practice.
- Use the equipment only as specified in this QIG and the Reference Manual. Failure to do so may impair the protection provided by the equipment.
- Do not perform any services other than those contained in this manual unless you are qualified.

Explosions could result in death or serious injury

- Verify that the operating environment of the transmitter is consistent with the appropriate hazardous locations specifications. See Product Certifications on page 25 in this Quick Installation Guide.
- To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.
- Before connecting a HART[®], FOUNDATION[™] fieldbus, or Modbus based communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- To avoid process leaks, only use O-rings designed to seal with the corresponding flange adapter.

Electrical shock can result in death or serious injury

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.
- Make sure the main power to the Rosemount 5300 Series transmitter is off and the lines to any other external power source are disconnected or not powered while wiring the transmitter.

Probes with non-conducting surfaces

Probes covered with plastic and/or with plastic discs may generate an ignition-capable level of electrostatic charge under certain extreme conditions. Therefore, when the probe is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

⚠ WARNING

Any substitution of non-authorized parts or repair, other than exchanging the complete transmitter head or probe assembly, may jeopardize safety and is prohibited.

Unauthorized changes to the product are strictly prohibited as they may unintentionally and unpredictably alter performance and jeopardize safety. Unauthorized changes that interfere with the integrity of the welds or flanges, such as making additional perforations, compromise product integrity and safety. Equipment ratings and certifications are no longer valid on any products that have been damaged or modified without the prior written permission of Emerson Process Management. Any continued use of product that has been damaged or modified without prior written authorization is at the customer's sole risk and expense.

⚠ WARNING

Eliminate the risk of ESD discharge prior to dismounting the transmitter head from the probe.

Probes may generate an ignition- capable level of electrostatic charge under extreme conditions.

During any type of installation or maintenance in a potentially explosive atmosphere the responsible person should make sure that any ESD risks are eliminated before attempting to separate the probe from the transmitter head.

Contents

Confirm system readiness	4	Safety Instrumented Systems (4-20 mA only)	21
Mount the transmitter head/probe	5	Product certifications	25
Connect the wiring	8		
Configure	15		

Step 1: Confirm system readiness

Confirm HART revision capability

- If using HART-based control or asset management systems, confirm the HART capability of those systems prior to transmitter installation. Not all systems are capable of communicating with the HART Revision 7 protocol. This transmitter can be configured for either HART Revision 5 or 7.
- For instructions on how to change the HART revision of your transmitter, see “Switch HART revision mode” on page 4.

Confirm correct Device Driver

- Verify that the latest Device Driver (DD/DTM) is loaded on your systems to ensure proper communication.
- Download the latest Device Driver from www.rosemount.com/LevelSoftware.

Rosemount 5300 device revisions and drivers

Table 1 provides the information necessary to ensure that you have the correct Device Driver and documentation for your device.

Table 1. Rosemount 5300 device revisions and files

Firmware Version ¹	Find Device Driver		Review Instructions	Review Functionality
	HART Universal Revision	Device Revision ²	Manual Document Number	Changes to Software ³
2F0 and later	7	4	00809-0100-4530 Rev EA	See footnote 3 for list of changes.
	5	3		
2A2 - 2D2	5	3	00809-0100-4530 Rev DA	N/A

1. Firmware version is printed on the transmitter head label, e.g. SW 2E0.

2. Device revision is printed on the transmitter head label, e.g. HART Dev Rev 4.

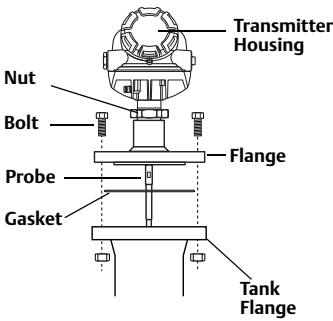
3. HART Revision 5 and 7 are selectable.

Switch HART revision mode

If the HART configuration tool is not capable of communicating with HART Revision 7, the Rosemount 5300 Series will load a Generic Menu with limited capability. The following procedures will switch the HART revision mode from the Generic Menu:

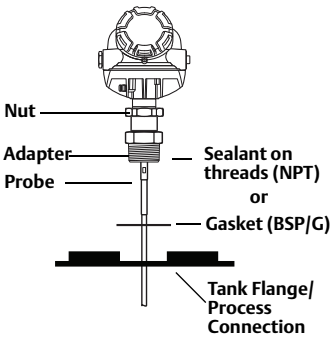
1. Manual Setup > Device Information > Identification > Message
 - To change to HART Revision 5, Enter: “HART5” in the Message field
 - To change to HART Revision 7, Enter: “HART7” in the Message field

Step 2: Mount the transmitter head/probe



Tank connection with flange

1. Place a gasket on top of the tank flange.
2. Lower the probe with flange into the tank.
3. Tighten the bolts and nuts with sufficient torque regarding flange and gasket choice.
4. Loosen the nut that connects the housing to the probe and rotate the housing to the desired direction.
5. Tighten the nut.

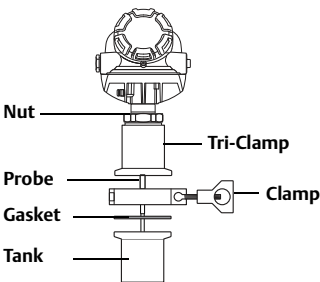


Threaded tank connection

1. For adapters with BSP/G threads, place a gasket on top of the tank flange.
2. Lower the probe into the tank.
3. Mount the adapter into the process connection.
4. Loosen the nut that connects the housing to the probe and rotate the housing to the desired direction.
5. Tighten the nut.

NOTE:

For adapters with NPT threads, pressure-tight joints require a sealant.

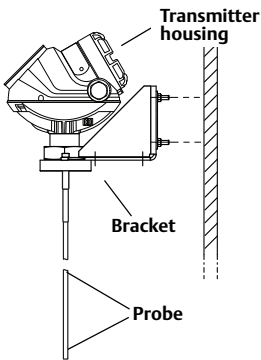


Tri-Clamp tank connection

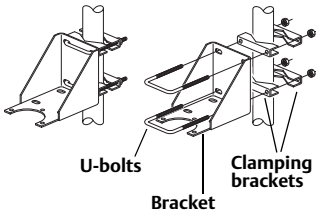
1. Place a gasket on top of the tank flange.
2. Lower the transmitter and probe into the tank.
3. Fasten the Tri-Clamp to the tank with a clamp.
4. Loosen the nut that connects the transmitter housing to the probe slightly.
5. Rotate the transmitter housing so the cable entries/display face the desired direction.
6. Tighten the nut.

Refer to the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530) for details regarding the mounting of transmitter head/probe.

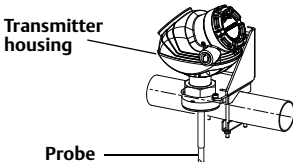
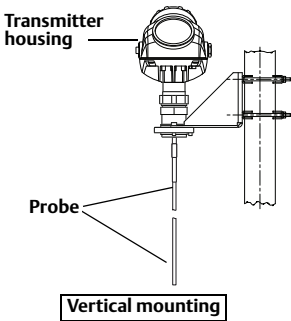
Step 2 continued...

**Bracket mounting, on wall**

1. Mount the bracket directly to the wall with screws suitable for the purpose.
2. Mount the transmitter with probe to the bracket and secure the installation with the three supplied screws.

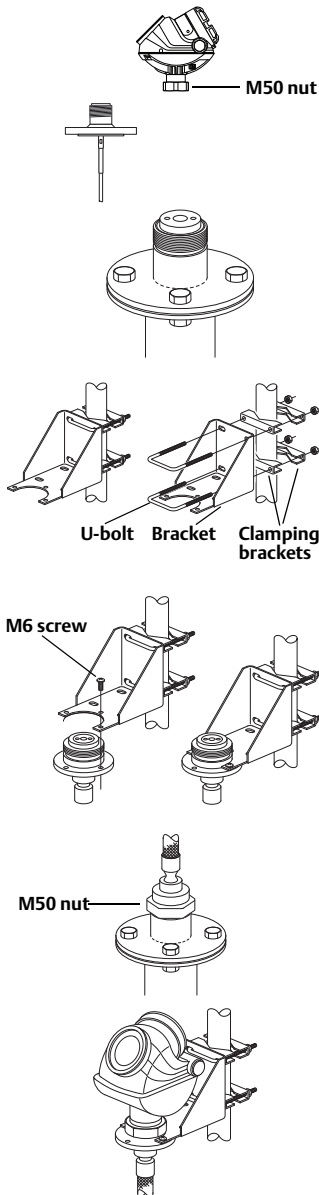
**Bracket mounting, on pipe**

1. Put the two U-bolts through the holes of the bracket. Holes are available for both vertical and horizontal pipe mounting.
2. Put the clamping brackets on the U-bolts and around the pipe.
3. Fasten the bracket to the pipe using the four supplied nuts.
4. Mount the transmitter with probe to the bracket and secure with the three supplied screws.

**Horizontal mounting**

See the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530) for more installation details.

Step 2 continued...

**Remote housing**

1. Remove the transmitter head from the probe by unscrewing the M50 nut.

For safety information regarding ESD discharge, see the applicable warning on [page 3](#).

2. Mount the probe in the tank.
3. Mount the bracket to the pole, making sure the distance between the probe and bracket does not exceed the length of the remote connection.
 - Put the two U-bolts through the holes of the bracket. Several holes are available for vertical/horizontal pipe mounting.
 - Put the clamping brackets on the U-bolts and around the pipe.
 - Use the supplied nuts to fasten the bracket to the pipe.
4. Fasten the housing support to the bracket using the M6 screws. The screws are threaded through the top of the mounting bracket and into the housing support.
5. Mount the probe housing on the probe, making sure that the M50 nut is properly tightened.
6. Connect the transmitter head on the housing support, making sure that the M50 nut is properly tightened.

Step 3: Connect the wiring

Wiring and power supply requirements can be dependent upon the approval certification. As with all FOUNDATION fieldbus requirements, a conditioned power supply and terminating resistors are required for proper operation.

It is recommended that shielded twisted pair wiring (18-12 AWG) suitable for the supply voltage be used and, if applicable, approved for use in hazardous areas. For electrical information, such as power supply, see diagrams and drawings for HART, Modbus, and FOUNDATION fieldbus on the following pages.

NOTE:

Avoid running instrument cable next to power cables in cable trays or near heavy electrical equipment.

It is important that the instrument cable shield be:

- trimmed close and insulated from touching the transmitter housing
- continuously connected throughout the segment
- connected to a good earth ground at the power supply end

Grounding

When wiring the transmitters, the grounding should be completed such that:

- The loop is grounded at the power supply.
- When transmitters are installed on metal tanks, ensure there is a metal-to-metal connection between the device and the tank.
- If the tank is non-metallic, the housing must be grounded to an earth ground that is separate from the power supply. The external ground terminal may be used for this purpose.
- If the tank is cathodically protected, the housing must be grounded to an earth ground that is outside of the cathodic protection system ground. Use the external terminal for this purpose.

When transient protection terminal block is used, the ground wire should be separate from the signal wire. Use the external ground terminal.

Make sure grounding is done (including IS ground inside Terminal compartment) according to Hazardous Locations Certifications, national and local electrical codes.

The most effective transmitter housing grounding method is a direct connection to earth ground with minimal ($< 1 \Omega$) impedance.

NOTE:

Grounding the transmitter housing using the threaded conduit connection may not provide a sufficient ground. The transient protection terminal block will not provide transient protection unless the transmitter housing is properly grounded. Use the above guidelines to ground the transmitter housing. Do not run transient protection ground wire with signal wiring; the ground wire may carry excessive current if a lightning strike occurs.

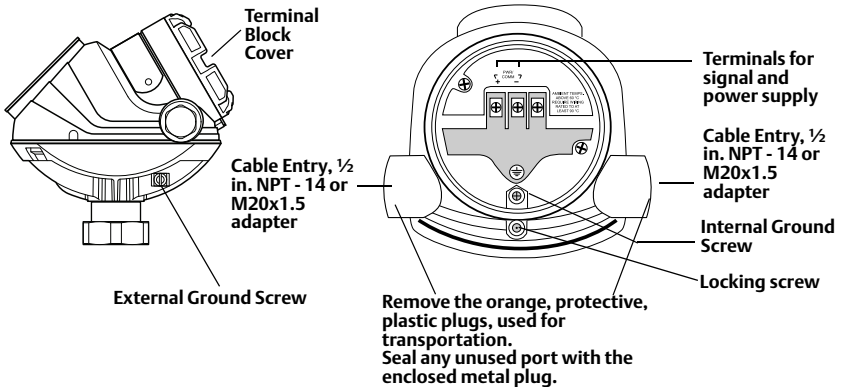
To connect the transmitter

1. Verify that the power supply is disconnected.
2. Remove the terminal block cover (see picture below).
3. Pull the cable through the cable gland/conduit. For Explosion-proof / Flameproof installations, only use cable glands or conduit entry devices certified Explosion-proof or Flameproof. Install wiring with a drip loop where the bottom of the loop must be lower than the cable/conduit entry.
4. To connect the wires, see the illustrations on the following pages.
5. Use the enclosed metal plug to seal any unused port.
6. Tighten the cable gland.
7. Mount the cover and make sure it is fully engaged to meet Explosion-proof requirements (adapters are required if M20 glands are used).
For ATEX, IECEx, NEPSI, INMETRO, and TIIS installations, lock the cover with the locking screw.
8. Connect the power supply.

NOTE:

Use PTFE tape or other sealant at the NPT threads in the Cable Entries.

Terminal block

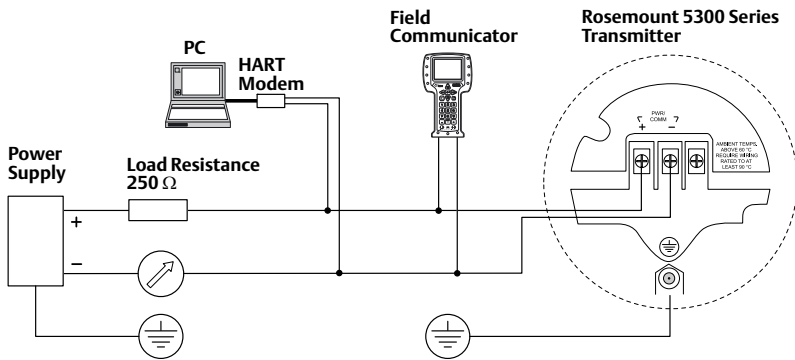


Step 3 continued...

HART communication

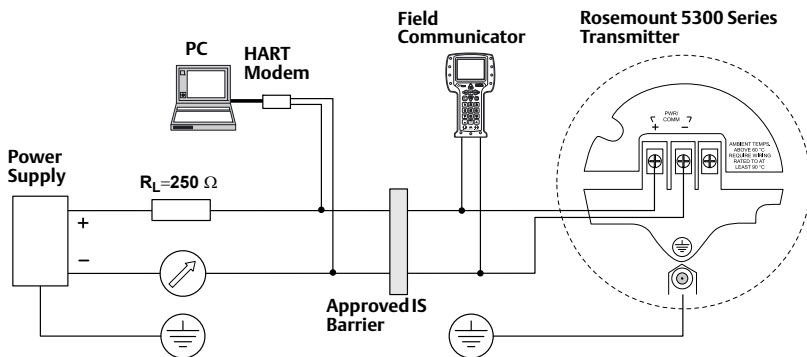
The Rosemount 5300 Series transmitter operates with a power supply ranging from 16 - 42.4 Vdc (16 - 30 Vdc in IS applications, 20-42.4 Vdc in Explosion-proof / Flameproof applications and in Non-Sparking / Energy Limited applications). All configuration tools for HART communication, such as the Field Communicator and Rosemount Radar Master, require a minimum load resistance (R_L) of 250 Ω within the loop in order to function properly, see diagrams below.

Non-intrinsically safe power supply

**NOTE:**

Rosemount 5300 Series Transmitters with Flameproof/Explosion-proof output have a built-in barrier; no external barrier needed.

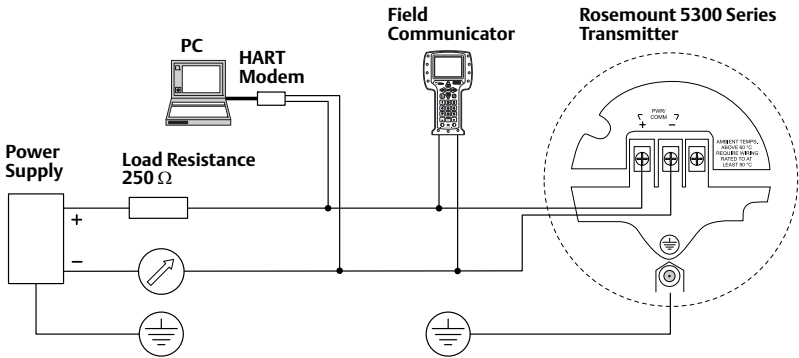
Intrinsically safe power supply



For IS Parameters, see the [Product certifications](#) chapter.

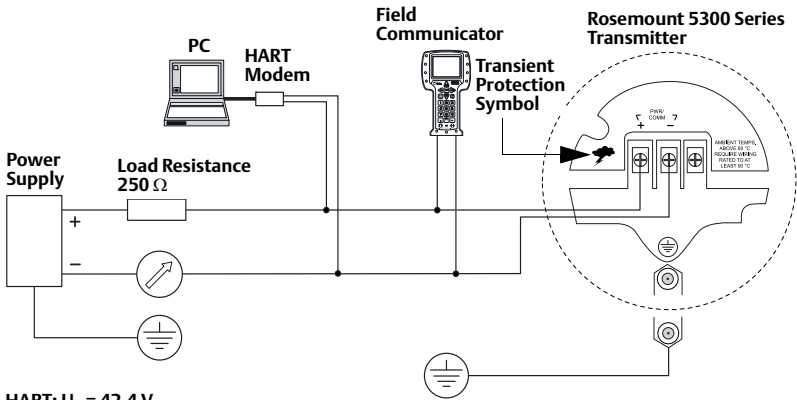
Step 3 continued...

Type n approvals : non-sparking / energy limited power supply



HART: $U_n = 42.4\text{ V}$

Transient protection terminal block



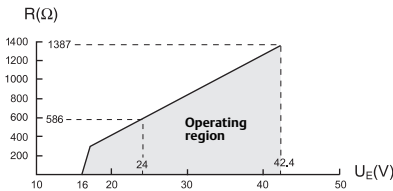
HART: $U_n = 42.4\text{ V}$

Step 3 continued...

Load limitations

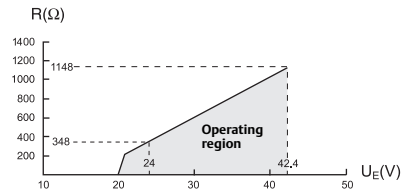
The Field Communicator requires a minimum load resistance of 250 Ω within the loop to function properly. The maximum load resistance can be obtained from the following diagrams.

Non-Hazardous Installations, and Non-Sparking / Energy Limited Power Supply



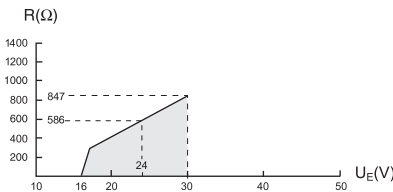
R(Ω): Maximum Load Resistance
 $U_E(V)$: External Power Supply Voltage

Explosion-proof/Flameproof (Ex d) Installations



R(Ω): Maximum Load Resistance
 $U_E(V)$: External Power Supply Voltage

Intrinsically Safe Installations



R(Ω): Maximum Load Resistance
 $U_E(V)$: External Power Supply Voltage

NOTE:

For Flameproof / Explosion-proof installations, the diagram is only valid if the HART load resistance is at the + side and if the - side is grounded. Otherwise, the load resistance value is limited to 435 Ω.

NOTE:

Rosemount 5300 Series Transmitters with Flameproof/Explosion-proof output have a built-in barrier; no external barrier needed.

Step 3 continued...

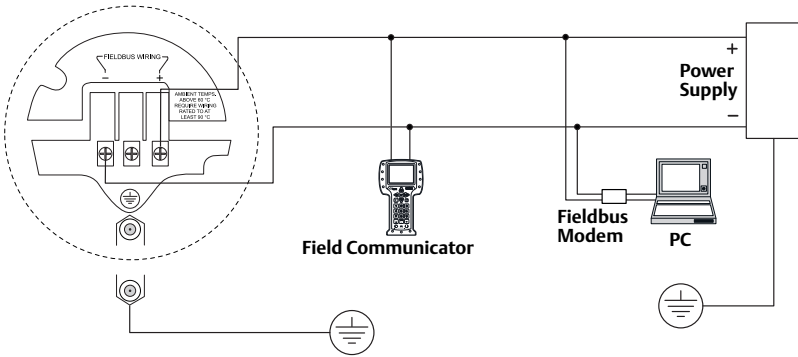
FOUNDATION fieldbus

The Rosemount 5300 Series transmitter, FOUNDATION fieldbus version, operates with a power supply ranging from 9 - 32 Vdc (9 - 30 Vdc in IS applications and 16 - 32 Vdc in Explosion-proof / Flameproof and in Non-Sparking / Energy Limited applications).

FISCO, IS applications: 9 - 17.5 Vdc.

Non-intrinsically safe power supply

Rosemount 5300 Series Transmitter

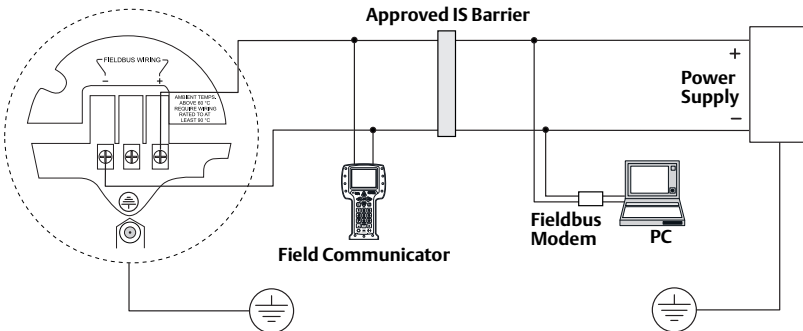


NOTE:

Rosemount 5300 Series Transmitters with Flameproof/Explosion-proof output have a built-in barrier; no external barrier needed.

Intrinsically safe power supply

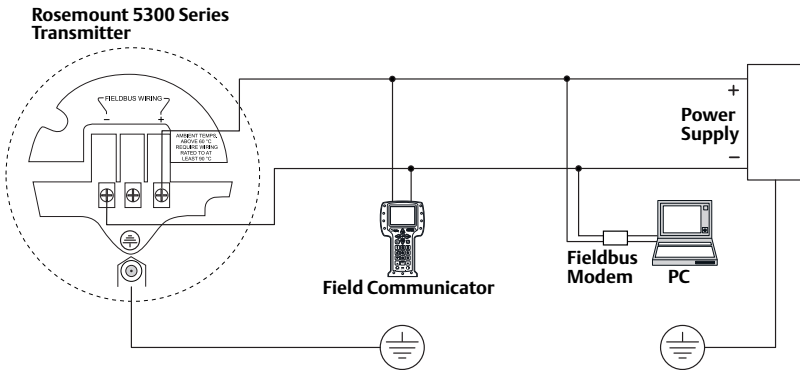
Rosemount 5300 Series Transmitter



For IS Parameters, see the [Product certifications](#) chapter.

Step 3 continued...

Type n approvals : non-sparking / energy limited power supply



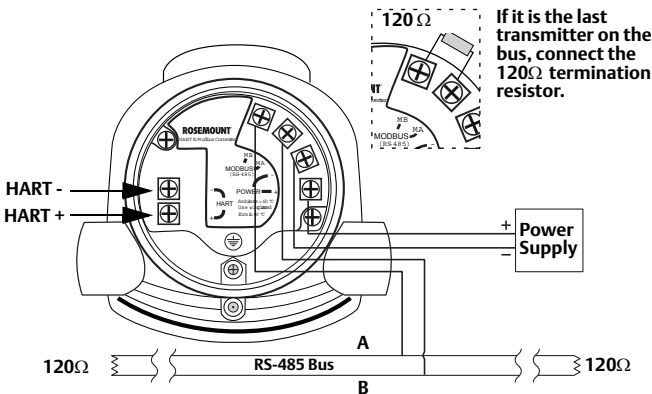
RS-485 with Modbus communication

The 5300 Series RS-485 with Modbus communication transmitter version operates using a power supply ranging from 8 - 30 Vdc (max. rating). See the Rosemount 5300/5400 Series with HART to Modbus Converter Manual supplement (Document No. 00809-0500-4530) for details.

Power Consumption:

< 0.5 W (with HART address = 1)

< 1.2 W (incl. four HART slaves)



NOTE:

Rosemount 5300 Series Transmitters with Flameproof/Explosion-proof output have a built-in barrier; no external barrier needed.

Step 4: Configure

NOTE:

If the transmitter is pre-configured at the factory, it is only necessary to proceed with the following steps if you need to verify or change the settings.

Basic configuration can easily be done either with Rosemount Radar Master, a Field Communicator, the AMS™ Suite, DeltaV®, or any other DD (Device Description) compatible host system. For advanced configuration features, Rosemount Radar Master is recommended.

Rosemount Radar Master Guided Setup includes a Wizard for Basic Configuration and a Device Specific Setup which are sufficient for most cases. Further configuration options are available using the Setup Functions, as described in the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

Configuration with Rosemount Radar Master Guided Setup is described on the following pages and the corresponding Field Communicator fast key sequence and FOUNDATION fieldbus parameters are given.

Help is accessed by selecting the Contents option from the Help menu. Help is also available through a Help button in most windows.

The configuration instructions in this Quick Installation Guide cover standard installations. For more complicated situations, such as interface applications or for installations that have disturbing objects within the radar beam etc, see the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

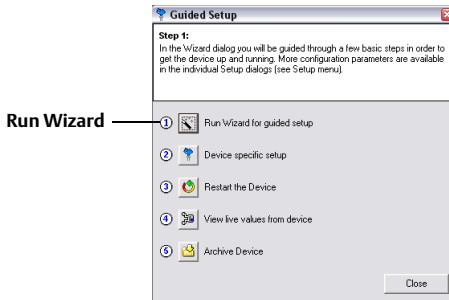
Installing the Rosemount Radar Master software

To install Rosemount Radar Master:

1. Insert the installation CD into the CD-ROM drive.
2. Follow the instructions. If the installation program does not start automatically, run Setup.exe from the CD.

Configuration using the Rosemount Radar Master software

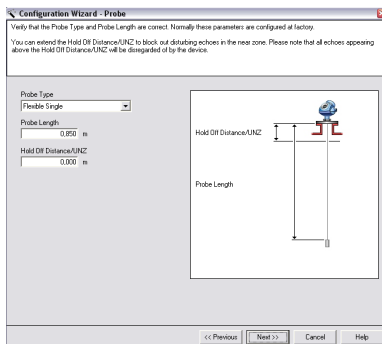
1. Start Rosemount Radar Master (*Programs > Rosemount > Rosemount Radar Master*).
2. Connect to the desired transmitter. Once the transmitter is connected, the *Guided Setup* window appears automatically.



3. Click the **Run Wizard for guided setup** button. Follow the instructions for a Basic Configuration and you will be guided through a short transmitter installation procedure.
4. The first window in the Configuration Wizard presents general information such as **Device Model** (5301 / 5302 / 5303), serial number, **Probe Type**, **Probe Length**, communication protocol, and device address. Check that the information complies with the ordering information. Click Next.
5. The *General* window lets you enter **Tag**, **Message**¹, **Descriptor**¹, and **Date**¹. This information is not required for operation of the transmitter and can be left out if desired.

Handheld HART Communicator: Fast Key Sequence [2, 2, 1].

Click Next and the following window appears (Probe).



6. Verify that the parameters in the *Probe* window are correct. The parameters

1) Only for HART communication.

are normally configured at the factory, but can be changed if, for example, the probe is cut in the field, or if disturbing objects in the near zone need to be blocked out (Hold Off Distance/Upper Null Zone (UNZ)).
Handheld HART Communicator: Fast Key Sequence [2, 1, 2].

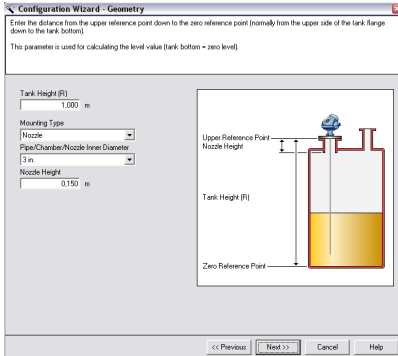
FOUNDATION fieldbus parameters:

TRANSDUCER_1100 > PROBE_TYPE

TRANSDUCER_1100 > PROBE_LENGTH

TRANSDUCER_1100 > GEOM_HOLD_OFF_DIST

Click Next and the following window appears (Geometry).



7. Enter **Tank Height**, the distance from the Upper Reference Point to the Lower Reference Point (which is the tank bottom in the screenshot above), making sure it is as accurate as possible. See Configuration in the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530) for details. Set **Mounting Type**. Set **Diameter** if Mounting Type is Nozzle or Pipe/Chamber. Set **Nozzle Height** if Mounting Type is Nozzle.

Handheld HART Communicator: Fast Key Sequence [2, 1, 3]

FOUNDATION fieldbus parameters:

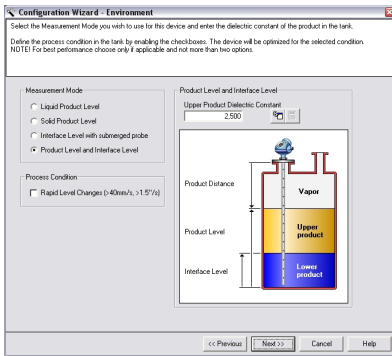
TRANSDUCER_1100 > GEOM_TANK_HEIGHT

TRANSDUCER_1100 > MOUNTING_TYPE

TRANSDUCER_1100 > PIPE_DIAMETER

TRANSDUCER_1100 > NOZZLE_HEIGHT

Click Next and the following window appears (Tank Environment).



- In the Environment window, select **Measurement Mode**. If the surface is moving up or down at rates over 40 mm/s (1.5 in./s), the **Rapid Level Changes** box should also be selected. Enter the **Upper Product Dielectric Constant** (icons for help functions are available to the right). For **Interface Level with Submerged Probe** and **Product and Interface measurement** modes, it is important that the dielectric constant value is exact. See the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530) for details.

Handheld HART Communicator: Fast Key Sequence [2, 1, 4]

FOUNDATION fieldbus parameters:

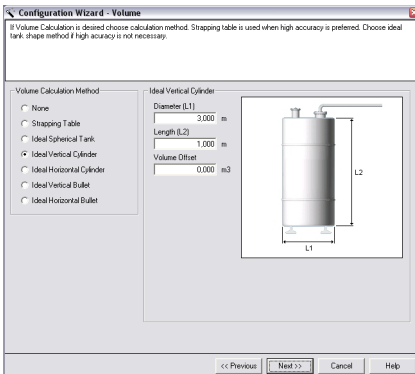
TRANSDUCER_1100 > MEAS_MODE

TRANSDUCER_1100 > PRODUCT_DIELEC_RANGE

TRANSDUCER_1100 > UPPER_PRODUCT_DC

TRANSDUCER_1100 > ENV_ENVIRONMENT

Click Next and the following window appears (Volume).



- If volume calculation is desired, choose a pre-defined **Volume Calculation Method** and tank dimensions based on a tank shape that corresponds to the actual tank. Choose **Strapping Table** if the actual tank does not match any of

the available pre-defined tank options, or if high volume accuracy is desired. Choose **None** if volume calculation is not desired.

Handheld HART Communicator: Fast Key Sequence [2, 1, 5]

FOUNDATION fieldbus parameters:

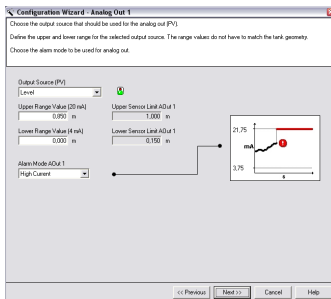
TRANSDUCER_1300 > VOL_VOLUME_CALC_METHOD

TRANSDUCER_1300 > VOL_IDEAL_DIAMETER

TRANSDUCER_1300 > VOL_IDEAL_LENGTH

TRANSDUCER_1300 > VOL_VOLUME_OFFSET

Click **Next** and the following window appears (Analog Output).



NOTE:

The 4-20 mA range must not include the upper transition zone, the lower transition zone, or the upper null zone. See the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530) for details.

10. This step is not applicable for FOUNDATION fieldbus, the parameters are entered in the AI-block instead.

Handheld HART Communicator: Fast Key Sequence [2, 1, 6]

For HART communication, choose Primary Variable, **PV**.

Specify the analog output range by setting the **Upper Range Value** (20 mA) and the **Lower Range Value** (4 mA) to the desired corresponding level values. The **Alarm Mode** specifies the output state when a measurement error occurs. Choose between the following:

High: 21.75 mA (standard) or 22.5 mA (Namur)

Low: 3.75 mA (standard) or 3.6 mA (Namur)

Freeze: the output current is set to the last valid value at the time when the error occurs.

Click Next.

11. Continue with Steps 2 to 5 in the *Guided Setup* window:

Step 2: Device specific setup might advise you to make further configurations.

Handheld HART Communicator: Fast Key Sequence [2, 1, 7, 2].

Step 3: Restart the device to make sure all configuration changes are properly activated.

Step 4: View live values from the device to verify that the transmitter works correctly.

Step 5: Make a complete backup of the device.

12. The Basic Configuration with the Radar Master Wizard is now finished. Proceed with the Device Specific Setup to see which additional configuration is needed. You may be required to calibrate Vapor Compensation, to set up Probe End Projection, or to perform a Trim Near Zone depending on type of the device, application, and functions available.

For further information, see the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

- Step 1: Run Wizard** _____
- Step 2: Device specific setup** _____
- Step 3: Restart the device** _____
- Step 4: View live values from the device** _____
- Step 5: Make a complete backup of the device** _____

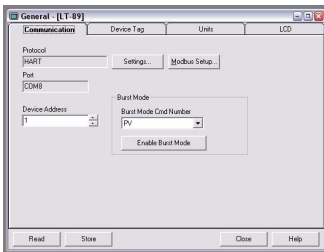


For Signal Quality Metrics information and further configuration, see the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

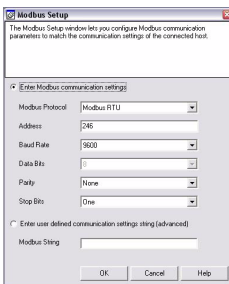
Setup - Modbus communication parameters

For transmitters with the Modbus option, do the following to configure the communication parameters:

1. In the **Setup** menu select **General**. The following window appears.



2. Choose the **Communication** tab.
3. Click **Modbus Setup**.



4. Enter the desired Modbus communication settings.

Safety Instrumented Systems (4-20 mA only)

The following section is applicable to the Rosemount 5300 Prior-Use option (Special certification: QS). Additional Safety Instrumented Systems information is available in the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530). The manual is available electronically at www.rosemount.com or by contacting an Emerson Process Management representative.

To identify a 5300 Prior-Use option transmitter:

- Verify the QS option code in the model code, on the label affixed to the outside of the transmitter head or
- Handheld HART Communicator: Fast Key Sequence [1, 7, 8]. Verify that the Prior-Use safety device is ON or
- Open Rosemount Radar Master, right click on the device, and select Properties. Verify that the Safety Device (QS Option) is present

Installation

The device should be installed and configured as a level sensing device per manufacturer's instructions. The materials must be compatible with process conditions and process fluids. No special installation is required in addition to the standard installation practices outlined in this document.

Environmental limits are available in the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530), Appendix A: Reference Data.

The loop must be designed so the terminal voltage does not drop below the minimum input voltage, see values in [Table 2](#), when the transmitter output is 22.5 mA.

Table 2. Minimum input voltage (U_i) at different currents

Hazardous approval	Current			
	3.60 mA	3.75 mA	21.75 mA	22.50 mA
	Minimum input voltage (U _i)			
Non-Hazardous Installations and Intrinsically Safe Installations	16 Vdc	16 Vdc	11 Vdc	11 Vdc
Explosion-proof / Flameproof Installations	20 Vdc	20 Vdc	15.5 Vdc	15.5 Vdc

Configuration

Use a HART-compliant master, such as Rosemount Radar Master or a Field Communicator, to communicate with and verify configuration of the Rosemount 5300 Series. A full review of configuration methods is available in the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

NOTE:

The Rosemount 5300 Series transmitter is not safety-rated during maintenance work, configuration changes, multidrop, loop test, or other activity that affects the Safety Function. Alternative means should be used to ensure process safety during such activities.

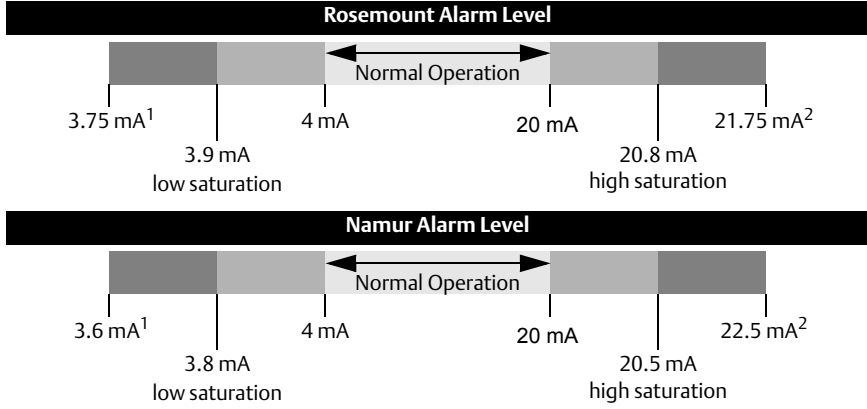
Damping

User adjusted damping affects the transmitter's ability to respond to process changes. Therefore, the *damping values + response time* should not exceed the Safety loop requirements.

Alarm and saturation levels

DCS or safety logic solver should be configured to handle both High alarm and Low alarm. Table 3 identifies the alarm levels available and their operation values.¹

Table 3. Alarm levels and operation values



1. Transmitter Failure, hardware or software alarm in Low position.
2. Transmitter Failure, hardware or software alarm in High position.

It is assumed that the current output signal is fed to a Safety Integrity Level 2 (SIL2) -compliant analog input board of a safety logic solver. For instructions on alarm level settings, see the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530), "Analog Output (HART)" section.

NOTE:

Only the High or Low Alarm Mode can be used for the Safety Function. Do not choose Freeze Current as an error will not be announced in the current loop.

Write protection

A Rosemount 5300 transmitter can be protected from unintentional configuration changes by a password protected function. It is recommended to use write protection described in the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530), "Write Protecting a Transmitter" section.

1) In certain cases, the transmitter does not go into the user defined alarm state. For example, in case of a short circuit, the transmitter goes into High Alarm state even if Low Alarm has been configured.

Site acceptance

After the installation and configuration, proper operation of the transmitter should be verified. A site acceptance test is therefore recommended. The proof test outlined in this section can be used for this.

Operation and maintenance

The Rosemount 5300 Series Prior-Use option must be tested at regular intervals to confirm that the overfill and empty tank protection function result in the desired system response. The following proof test is recommended. If an error is found in the safety functionality, the measuring system must be switched out of service and the process held in a safe state by means of other measures.

Proof test results and corrective actions taken must be documented at www.emersonprocess.com/rosemount/safety.

The required proof test intervals depend on the transmitter configuration and process environment. Refer to the reference manual and the Failure Modes, Effects, and Diagnostic Analysis (FMEDA) report for further information.

Proof test

This test detects approximately 95% of the possible Dangerous Undetected (DU) failures of the transmitter including the sensor element, not detected by the transmitter's automatic diagnostics. See the Rosemount 5300 Reference Manual (Document No. 00809-0100-4530) for additional details and instructions. Prior to this test, the echo curve should be inspected to ensure that no disturbing echoes affecting the measurement performance are present in the tank.

Required tools: Field Communicator and mA meter.

1. Bypass the logic solver or take other appropriate actions to avoid false trip.
2. Disable write protection if the function is enabled.
3. Using Loop Test, enter the mA value representing a high alarm current output. Verify that the analog current reaches that value using the reference meter.
This step tests for compliance voltage problems, such as a low loop power supply voltage or increased wiring resistance.

NOTE:

Use the Handheld HART Communicator: Fast Key Sequence [2, 4, 1, 4] to perform a Loop Test. See the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530) for additional information.

-
4. Using Loop Test, enter the mA value representing a low alarm current output. Verify that the analog current reaches that value using the reference meter.
This step tests for possible quiescent current related failures.
 5. Perform a two-point calibration check of the transmitter by applying level to two points on the probe within the measuring range¹. Verify that the current output corresponds to the level input values using a known reference measurement.
This step verifies that the analog output is correct in the operating range and that the Primary Variable is properly configured.

1) For best performance, use the 4 - 20 mA range points as calibration points.

6. Enable write protection.
7. Restore the loop to full operation.
8. Remove the bypass from the safety logic solver or otherwise restore normal operation.
9. Document the test result for future reference.

Inspection

Visual inspection

It is recommended to inspect the probe for possible build up or clogging.

Special tools

Not required.

Product repair

All failures detected by the transmitter diagnostics or by the proof test must be reported. Feedback can be submitted electronically at www.emersonprocess.com/rosemount/safety (**Contact Us**).

The Rosemount 5300 Series is repairable by complete transmitter head replacement. Contact your local Emerson Process Management representative to perform the replacement. Additional information is available in the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

References

Specifications

The Rosemount 5300 must be operated in accordance with the functional and performance specifications provided in the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530), Appendix A: Reference Data.

Failure rate data

The FMEDA report includes failure rates and common cause Beta factor estimates. The full report is accessible at www.emersonprocess.com/rosemount/safety/PriorUse.htm.

Useful lifetime

The established failure rates of electrical components apply within the useful lifetime, which should be based on experience. According to IEC 61508-2, 7.4.7.4, note 3, the useful lifetime often lies within a range of 8 to 12 years for transmitters.

Product certifications

EU conformity

The EC declaration of conformity can be found on [page 33](#). The most recent revision of the EC declaration of conformity can be found at www.rosemount.com.

Safety Instrumented Systems (SIS)

The Rosemount 5300 Series has been evaluated by a third party, Exida, against hardware requirements according to IEC 61508. With a FMEDA (Failure Modes, Effects and Diagnostics Analysis) report with a Safe Failure Fraction (SFF) above 90%, 5300 is suitable in SIS according to the Prior Use methodology. For more information, go to: <http://emersonprocess.com/rosemount/safety/>. To order the certificate of FMEDA data, use option code QS.

Hazardous Locations certifications

North-American certifications

Factory Mutual (FM) approvals

Project ID: 3020497



Specific conditions of use:

WARNING: Potential Electrostatic Charging Hazard - The enclosure is constructed from plastic. To prevent the risk of electrostatic sparking, the plastic surface should only be cleaned with a damp cloth.

WARNING: The apparatus enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

E5¹ Explosion-proof:

Explosion-proof for Class I, Div. 1, Groups B, C, and D;

Dust-ignition-proof for Class II/III, Div. 1, Groups E, F, and G;

With Intrinsically Safe connections to Class I, II, III, Div. 1, Groups B, C, D, E, F, and G.

Temp. Code T4

Ambient temperature limits: -50 °C to +70 °C².

Seal not required.

Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

1) Ordering information code for Product Certifications, see the Rosemount 5300 Series Product Data Sheet (Document No. 00813-0100-4530) or the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

2) +60 °C with FOUNDATION fieldbus or FISCO option.

I5, IE¹ Intrinsically safe and FISCO model:

Intrinsically Safe for Class I, II, III, Div. 1, Groups A, B, C, D, E, F, and G,
Class I, Zone 0, AEx ia IIC T4 when installed per Control Drawing: 9240 030-936.

Non-Incendive Class I, Div. 2, Groups A, B, C, D, F, and G;

Suitable for Class II, III, Div. 2, Groups F and G;

4-20 mA/HART model: $U_i = 30$ Vdc, $I_i = 130$ mA, $P_i = 1.0$ W, $C_i = 7.26$ nF, $L_i = 0$ H.

Max. operation: 42.4 V, 25 mA

FOUNDATION fieldbus model: $U_i = 30$ Vdc, $I_i = 300$ mA, $P_i = 1.3$ W, $C_i = 0$ nF, $L_i = 0$ H.

Max. operation: 32 V, 25 mA

FISCO model: $U_i = 17.5$ Vdc, $I_i = 380$ mA, $P_i = 5.32$ W, $L_i = C_i = 0$.

Temp. Code T4

Ambient temperature limits: -50 °C to +70 °C²

Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

Canadian Standards Association (CSA) approvals

Certificate: 1514653

Product options bearing the Dual Seal marking meets the Dual Seal Requirements of ANSI/ISA12.27.01-2003.

Dual seal annunciation

The breach of the secondary seal is annunciated via product leakage from the antenna's vents. The leakage will be visible and/or audible from the transmitter head's threads.

Dual seal maintenance

No maintenance required. Verify proper operation by keeping leak path free from ice or contamination.

WARNING: The substitution of components may impair intrinsic safety.

E6¹ Explosion-proof with internal intrinsically safe circuits [Exia]

Class I, Div. 1, Groups B, C, and D;

Class II, Div. 1 and 2, Groups E, F, and G;

Class III, Div. 1

Temp Code T4.

Ambient temperature limits -50 °C to +70 °C²

Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I6, IF¹ Intrinsically Safe Exia:

Class I, Div. 1, Groups A, B, C, and D.

Temp Code T4.

4-20 mA/HART model: $U_i = 30$ Vdc, $I_i = 130$ mA, $P_i = 1.0$ W, $C_i = 7.26$ nF, $L_i = 0$ H.

FOUNDATION fieldbus model: $U_i = 30$ Vdc, $I_i = 300$ mA, $P_i = 1.3$ W, $C_i = 0$ nF, $L_i = 0$ H.

FISCO model: $U_i = 17.5$ Vdc, $I_i = 380$ mA, $P_i = 5.32$ W, $L_i = C_i = 0$.

Installation Drawing: 9240 030-937

Ambient temperature limits -50 °C to +70 °C².

Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

1) Ordering information code for Product Certifications, see the Rosemount 5300 Series Product Data Sheet (Document No. 00813-0100-4530) or the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

2) +60 °C with FOUNDATION fieldbus or FISCO option.

European certifications

ATEX approvals

Special conditions for safe use (X)

The intrinsically safe circuits do not withstand the 500 V AC test as specified in IEC 60079-11 clause 6.4.12.

Impact and friction hazards need to be considered according to EN 60079-0 clause 8.1.2 when the transmitter and part of antennas exposed to the exterior atmosphere of the tank is made with light metal alloys and of category II 1G EPL Ga.

The Ex ia version of model 5300 FISCO field device may be supplied by an [Ex ib] FISCO power supply when the power supply is certified with three separate safety current limiting devices and voltage limitation which meets the requirements for type Ex ia.

E1¹ Flameproof:

Nemko 04ATEX1073X



II 1/2 G T4



II 1D T79 °C²

Ex ia/db ia IIC T4 Ga/Gb (-40 °C ≤ T_a ≤ +70 °C³)

Ex ta IIIC T79 °C² (-40 °C ≤ T_a ≤ +70 °C³)

U_m = 250 V

Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I1, IA¹ Intrinsically safe and FISCO model:

Nemko 04ATEX1073X



II 1 G T4 or



II 1/2 G T4

II 1 D T79 °C²

Ex ia IIC T4 (-50 °C ≤ T_a ≤ +70 °C³)

Ex ia/ib IIC T4 Ga/Gb (-50 °C ≤ T_a ≤ +60 °C)

Ex ta IIIC T79 °C² (-50 °C ≤ T_a ≤ +70 °C³)

4-20 mA/HART model: U_i = 30 Vdc, I_i = 130 mA, P_i = 1.0 W,

C_i = 7.26 nF, L_i = 0 H.

FOUNDATION fieldbus model: U_i = 30 Vdc, I_i = 300 mA, P_i = 1.5 W,

C_i = 4.95 nF, L_i = 0 H.

FISCO model: U_i = 17.5 Vdc, I_i = 380 mA, P_i = 5.32 W, C_i = 4.95 nF, L_i < 1 μH.

Installation Drawing: 9240 030-938

Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

N1¹ Type n:



II 3G Ex nAnL IIC T4 Gc (-50 °C < T_a < +70 °C³)



II 3G Ex nL IIC T4 Gc (-50 °C < T_a < +70 °C³)

Nemko 10ATEX1072

4-20 mA/HART model: U_n = 42.4 V

FOUNDATION fieldbus model: U_n = 32 V

Approval valid for HART and FOUNDATION fieldbus options.

- 1) Ordering information code for Product Certifications, see the Rosemount 5300 Series Product Data Sheet (Document No. 00813-0100-4530) or the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).
- 2) +69 °C with FOUNDATION fieldbus or FISCO option.
- 3) +60 °C with FOUNDATION fieldbus or FISCO option.

Brazilian certifications

INMETRO approvals



Special conditions for safe use (X)

Letter X in the number of the certificate indicates the following special condition(s) for safe use:

- For models 530xFxxxxxxxxxE1..., 530xFxxxxxxxxxKA..., 530xFxxxxxxxxKB... or 530xFxxxxxxxxKC... and when the sensor area requires an EPL Ga, the installation of the transmitter on the process wall must be done in a way that ensures the minimum degree of protection IP67 in the connection, in compliance with regulation ABNT NBR IEC 60529.
- The intrinsically safe circuit did not withstand the dielectric rigidity tests with 500 Vca as specified in clause 6.4.12 of regulation IEC 60079-11.
- Probes covered with plastic or plastic discs should have a non-conductive area not exceeding the maximum permitted area for the MC group, which is 4 cm². Therefore, when an antenna is used in a potentially explosive atmosphere, appropriate measures should be taken by the user to prevent electrostatic discharge.
- This equipment contains light metals. The equipment must be installed in a way that the risk of impact or friction with other metal surfaces is eliminated.
- The Ex ia version of the field device of model FISCO 5300 can be provided with a FISCO [Ex ib] power supply when the power supply is certified with three current limiter safety devices separately and with limitation of voltage, complying with the requirements of the Ex ia model.

Certificate: NCC 4205/07X

Standards:

ABNT NBR IEC: 60079-0:2008/2010, 60079-1:2009, 60079-11:2009, 60079-26:2008
IEC 60079-31:2008

E2¹ Flameproof:

4-20 mA/HART model:

Ex d ia IIC T4 Gb/Ga

Ex ta IIIC T79 °C

-40 °C ≤ T_a ≤ +70 °C

U_m: 250 V

FOUNDATION fieldbus model:

Ex d ia IIC T4 Gb/Ga

Ex ta IIIC T69 °C

-40 °C ≤ T_a ≤ +60 °C

U_m: 250 V

MODBUS model:

Ex d ia IIC T4 Gb/Ga

Ex ta IIIC T79 °C

-40 °C ≤ T_a ≤ +70 °C

U_m: 250 V

1) Ordering information code for Product Certifications, see the Rosemount 5300 Series Product Data Sheet (Document No. 00813-0100-4530) or the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

I2¹ Intrinsically safe:

4-20 mA/HART model:

Ex ia IIC T4 Ga

Ex ta IIIC T79 °C

-50 °C ≤ T_a ≤ +70 °CU_i: 30 V, I_i: 130 mA, P_i: 1.0 W, L_i: 0 μH, C_i: 7.26 nF

FOUNDATION fieldbus model:

Ex ia IIC T4 Ga

Ex ta IIIC T69 °C

-50 °C ≤ T_a ≤ +60 °CU_i: 30 V, I_i: 300 mA, P_i: 1.5 W, L_i: 0 μH, C_i: 4.95 nF

Installation Drawing: 9240030-938

IB¹ FISCO model:

FISCO Field Device

Ex ia IIC T4 Ga

Ex ia/ib IIC T4 Ga/Gb

Ex ta IIIC T69 °C

-50 °C ≤ T_a ≤ +60 °CU_i: 17.5 V, I_i: 380 mA, P_i: 5.32 W, L_i: <1 μH, C_i: 4.95 nF

Installation Drawing: 9240030-938

Chinese certifications

National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation (NEPSI) approvals

**Special conditions for safe use (X):**

Refer to Certificates GYJ 111230X and GYJ 081131X.

E3¹ Flameproof:

HART model:

Ex d ia IIC T4 (-40 °C < T_a < +70 °C) DIP A20 T_A79 °C

FOUNDATION fieldbus model:

Ex d ia IIC T4 (-40 °C < T_a < +60 °C) DIP A20 T_A69 °C

Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I3¹ Intrinsically safe:

HART model:

Ex ia IIC T4 (-50 °C < T_a < +70 °C) DIP A20 T_A79 °C4-20 mA/HART model: U_i = 30 V, I_i = 130 mA, P_i = 1.0 W, C_i = 7.26 nF, L_i = 0 μH

FOUNDATION fieldbus model:

Ex ia IIC T4 (-50 °C < T_a < +60 °C) DIP A20 T_A69 °CU_i = 30 V, I_i = 300 mA, P_i = 1.5 W, C_i = 4.95 nF, L_i = 0 μH

Approval valid for HART and FOUNDATION fieldbus options.

1) Ordering information code for Product Certifications, see the Rosemount 5300 Series Product Data Sheet (Document No. 00813-0100-4530) or the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

IC¹ FOUNDATION fieldbus FISCO model:

Ex ia IIC T4 (-50 °C < T_a < +60 °C) DIP A20 T_A69 °C

U_i = 17.5 V, I_i = 380 mA, P_i = 5.32 W, C_i = 4.95 nF, L_i < 0.1 μH

N3 Type n:

HART model:

Ex nL IIC T4 (-50 °C < T_a < +70 °C)

U_i = 30 V, I_i = 130 mA, P_i = 1.0 W, C_i = 7.26 nF, L_i = 0 μH

FOUNDATION fieldbus model:

Ex nL IIC T4 (-50 °C < T_a < +60 °C)

U_i = 30 V, I_i = 300 mA, P_i = 1.5 W, C_i = 4.95 nF, L_i = 0 μH

Japanese certifications

Technology Institution of Industrial Safety (TIIS) approval

**Special conditions for safe use (X):**

Refer to certificate TC20104 and TC20192.

E4¹ Flameproof:

4-20 mA/HART model:

Transmitter: Ex d [ia] IIC T4x

-20 ~ +60 °C

DC 20 - 42.4 V

U_m = 250 V

U_o = 22.2 V

I_o = 177.5 mA

P_o = 0.985 W

Probe: Ex Ia IIC T4X

FOUNDATION fieldbus model:

Transmitter: Ex d [ia] IIC T4X

-20 ~ +60 °C

DC 16 - 32 V

U_m = 250 V

U_o = 22.2 V

I_o = 177.5 mA

P_o = 0.985 W

Probe: Ex ia IIC T4X

Installation Drawing: 05300-00548.

Approval valid for HART and FOUNDATION fieldbus options.

1) Ordering information code for Product Certifications, see the Rosemount 5300 Series Product Data Sheet (Document No. 00813-0100-4530) or the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530)

IECEx certifications

IECEx approvals



Special conditions for safe use (X)

The intrinsically safe circuits do not withstand the 500 V AC test as specified in IEC 60079-11 clause 6.4.12.

Impact and friction hazards need to be considered according to EN 60079-0 clause 8.1.2 when the transmitter and part of antennas exposed to the exterior atmosphere of the tank is made with light metal alloys and of category EPL Ga.

The Ex ia version of model 5300 FISCO field device may be supplied by an [Ex ib] FISCO power supply when the power supply is certified with three separate safety current limiting devices and voltage limitation which meets the requirements for type Ex ia.

E7¹ Flameproof:

IECEx NEM 06.0001X

Ex ia/db ia IIC T4 Ga/Gb ($-40^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}^2$)

Ex ta IIIC T 79 °C³ ($-40^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}^2$)

U_m = 250 V.

Approval valid for HART, FOUNDATION fieldbus, and Modbus options.

I7, IG¹ Intrinsically safe and FISCO model:

IECEx NEM 06.0001X

Ex ia IIC T4 ($-50^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}^2$).

Ex ia/ib IIC T4 Ga/Gb ($-50^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$).

Ex ta IIIC T 79 °C³ ($-50^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}^2$).

4-20 mA/HART model: U_i = 30 Vdc, I_i = 130 mA, P_i = 1.0 W,

C_i = 7.26 nF, L_i = 0 H.

FOUNDATION fieldbus model: U_i = 30 Vdc, I_i = 300 mA, P_i = 1.5 W, C_i = 4.95 nF, L_i = 0 H.

FISCO model: U_i = 17.5 Vdc, I_i = 380 mA, P_i = 5.32 W, C_i = 4.95 nF, L_i < 1 μH.

Installation Drawing: 9240 030-938

Approval valid for HART, FOUNDATION fieldbus, and FISCO options.

N7¹ Type n:

Ex nAnL IIC T4 ($-50^{\circ}\text{C} < T_a < +70^{\circ}\text{C}^2$)

Ex n IIC T4 ($-50^{\circ}\text{C} < T_a < +70^{\circ}\text{C}^2$)

IECEx NEM 10.0005

4-20 mA/HART model: U_n = 42.4 V

FOUNDATION fieldbus model: U_n = 32 V

Approval valid for HART and FOUNDATION fieldbus options.

- 1) Ordering information code for Product Certifications, see the Rosemount 5300 Series Product Data Sheet (Document No. 00813-0100-4530) or the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).
- 2) +60 °C with FOUNDATION fieldbus or FISCO option.
- 3) +69 °C with FOUNDATION fieldbus or FISCO option.

Other certifications

Overfill protection

Cert. no: Z-65.16-476

U1 TÜV-tested and approved by DIBt for overfill protection according to the German WHG regulations

Approval valid for HART and FOUNDATION fieldbus options.

Suitability for intended use

Compliant with NAMUR NE 95, version 07.07.2006 "Basic Principles of Homologation"

For detailed information on product certificates, refer to the Rosemount 5300 Series Reference Manual (Document No. 00809-0100-4530).

EC Declaration of Conformity

Figure 1. EC Declaration of Conformity - page 1

ROSEMOUNT	CE
EC Declaration of Conformity No: 5300	
We,	
Rosemount Tank Radar AB Box 13045 S-402 51 GÖTEBORG Sweden	
declare under our sole responsibility that the product,	
Rosemount 5300 Series Level and Interface Transmitter	
manufactured by,	
Rosemount Tank Radar AB Box 13045 S-402 51 GÖTEBORG Sweden	
to which this declaration relates, is in conformity with the provisions of the European Community Directives, including amendments, as shown in the attached schedule.	
Assumption of conformity is based on the application of the harmonized standards and, when applicable or required, a European Community notified body certification, as shown in the attached schedule.	
 _____ (signature)	Manager Product Approvals _____ (function name - printed)
Dajana Prastalo _____ (name - printed)	2011-12-12 _____ (date of issue)
	

Figure 2. EC Declaration of Conformity - page 2



ROSEMOUNT	CE
Schedule No: 5300	
<hr/>	
EMC, Electromagnetic Compatibility Directive (2004/108/EC)	
EN 61326-1:2006; EN 61236-3-1:2006	
<hr/>	
PED, Pressure Equipment Directive (97/23/EC)	
In compliance Sound Engineering Practice according to Article 3.3 of the Directive	
<hr/>	
ATEX, Explosive Atmospheres Directive (94/9/EC)	
Nemko 04ATEX1073X	
Intrinsically Safe / Entity: Equipment Group II, Category 1 G (Ex ia IIC T4)	
Intrinsically Safe / FISCO: Equipment Group II, Category 1 G (Ex ia IIC T4) or Category 1/2 G (Ex ia/ib IIC T4 Ga/Gb)	
Flameproof: Equipment Group II, Category 1/2 G (Ex ia/db ia IIC T4 Ga/Gb)	
Dust: Equipment Group II, Category 1 D (Ex ta IIIC T69°C/T79°C)	
EN 60079-0:2009; EN 60079-1:2007; EN 60079-11:2007; EN 60079-26:2007; EN 60079-27:2008; EN 60079-31:2009	
Nemko 10ATEX1072	
Type of protection N, Non-sparking: Equipment Group II, Category 3 G (Ex nAnL IIC T4 Gc) Type of protection N, Energy Limited: Equipment Group II, Category 3 G (Ex nL IIC T4 Gc)	
EN60079-0:2009; EN60079-15:2005	
 EMERSON Process Management	Page 2 of 3

Figure 3. EC Declaration of Conformity - page 3

ROSEMOUNT	Schedule No: 5300	CE
ATEX Notified Body for EC Type Examination Certificates and Type Examination Certificates		
Nemko AS [Notified Body Number: 0470] Gautstadalléen 30 0373 OSLO Norway		
ATEX Notified Body for Quality Assurance		
Det Norske Veritas Certification AS [Notified Body Number: 0575] Veritasveien 1 1363 HØVIK Norway		
 EMERSON Process Management	Page 3 of 3	



Emerson Process Management

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